ABSTRACT

[0325] A novel method of pyrophosphorolysis activated polymerization (PAP) has been developed. In PAP, pyrophosphorolysis and polymerization by DNA polymerase are coupled serially for each amplification by using an activatable oligonucleotide P* that has a non-extendible 3'-deoxynucleotide at its 3' terminus. PAP can be applied for exponential amplification or for linear amplification. PAP can be applied to amplification of a rare allele in admixture with one or more wild-type alleles by using an activatable oligonucleotide P* that is an exact match at its 3' end for the rare allele but has a mismatch at or near its 3' terminus for the wild-type allele. PAP is inhibited by a mismatch in the 3' specific sequence as far as 16 nucleotides away from the 3' terminus. PAP can greatly increase the specificity of detection of an extremely rare mutant allele in the presence of the wild-type allele. Specificity results from both pyrophosphorolysis and polymerization since significant nonspecific amplification requires the combination of mismatch pyrophosphorolysis and misincorporation by the DNA polymerase, an extremely rare event. Using genetically engineered DNA polymerases greatly improves the efficiency of PAP.